UM0441
User manual

VT5363 laser reference design mouse

Introduction

This user manual, along with the VT5363 datasheet will enable you to evaluate the VT5363 laser reference design mouse and assist you in the design of your own VT5363 laser wired mouse. If you have any questions, support can be obtained through the normal regional sales/support groups.

Kit contents

- Mini reference design mouse
- 5 x VT5363V032 optical mouse sensor
- 3 x Optics - see *Chapter 2*
- 5 x VCSEL

Table 1. Device summary

Order code	Description
STV-363-R03	VT5363 laser wired mini reference design mouse

1 Hardware

1.1 Bill of materials

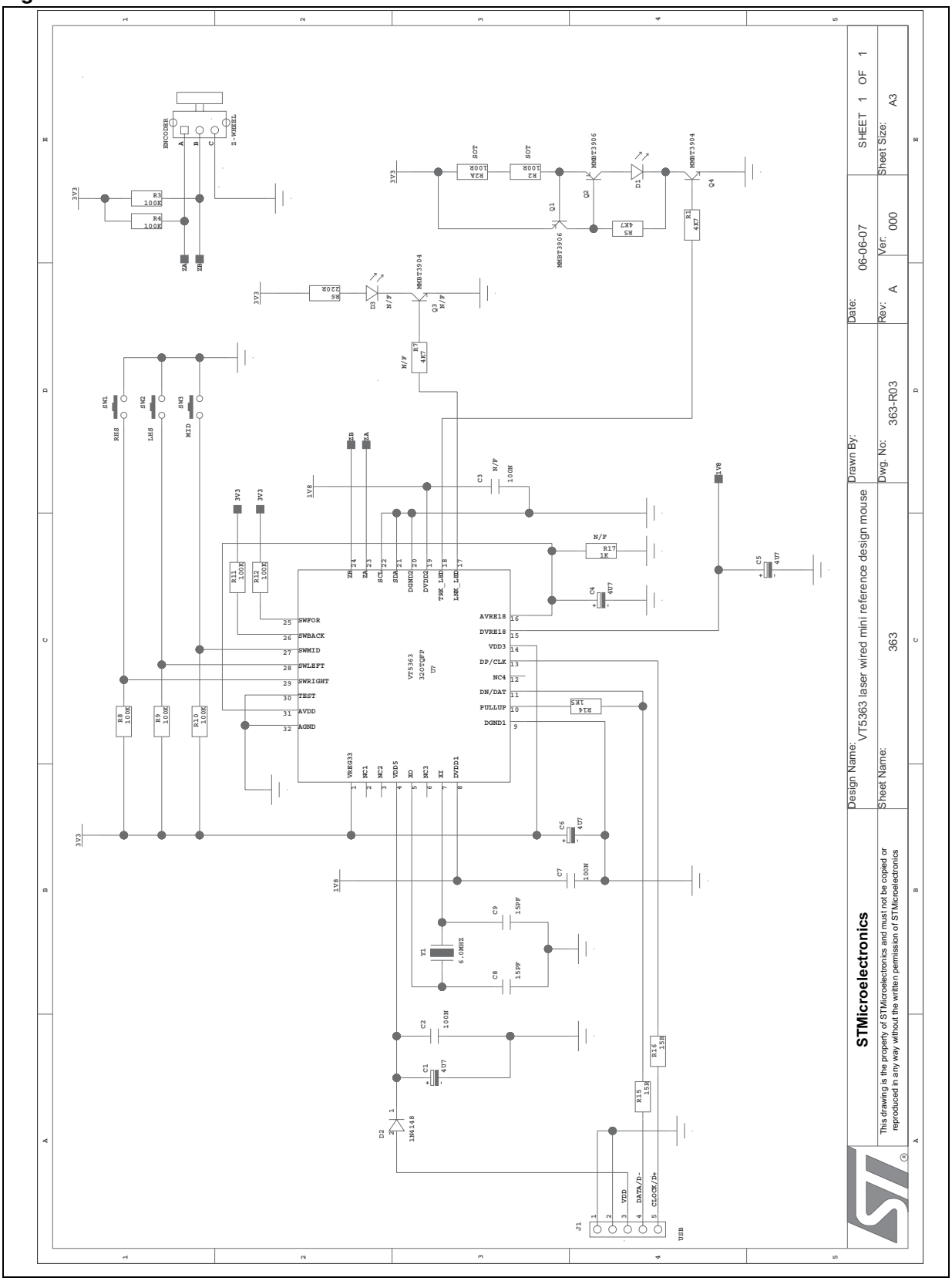
Table 2. Laser mouse BOM

Ref.	Description	Manufacturer	Part Number
U1	Optical mouse sensor	STMicroelectronics	VT5363V032
Optics	LML 853 slim type	Luxnet	LML 853
D1	VCSEL LD851	Luxnet	LD 851
SW1,SW2,SW3	2 pin switch (DIP type)	Standard component - many suppliers	
SWM	Mechanical encoder (ZWheel)	Standard component - many suppliers	
C1,C4,C5,C6	4.7uF tantalum capacitor	Standard component - many suppliers	
C2,C7	104pF ceramic capacitor	Standard component - many suppliers	
C8,C9	15pF ceramic capacitor	Standard component - many suppliers	
Q1,Q2	PNP Transistor - MMBT3906	Standard component - many suppliers	
Q4	NPN Transistor - MMBT3904	Standard component - many suppliers	
R2,R2A	100R resistor	Standard component - many suppliers	
R6	220R resistor	Standard component - many suppliers	
R1,R5,R7	4K7 resistor	Standard component - many suppliers	
R14	1K5 resistor	Standard component - many suppliers	
R3,R4,R8,R9, R10,R11,R12	100K resistor	Standard component - many suppliers	
R15,R16	15R resistor	Standard component - many suppliers	
Y1	6MHz resonator	Standard component - many suppliers	
D2	Diode 1N4148	Standard component - many suppliers	
R7, R17, C3, Q3, D3	Not fitted		

1.2 Schematic

See *Figure 1: Laser mouse schematic*.

Figure 1. Laser mouse schematic



2 Optics/VCSEL

2.1 Manufacturer

STMicroelectronics has worked with an optical component / VCSEL supplier to produce a single piece light guide and laser bundle, for more information please contact.

Luxnet Corporation
No. 50, Lung-Yuan 7th Road,
Lung-Tan Tao-Yuan Hsien,
Taiwan
Tel: 886-3-409-1335
Fax: 886-3-409-1339
http://www.luxnetcorp.com

The Luxnet optics and VCSEL order codes are detailed in *Table 3* below.

Table 3. Luxnet order codes

Part number	Description
LML 853	Laser optics
LD 851	SIngle-mode VCSEL laser lamp

2.2 Optics drawings

Figure 2. Optics

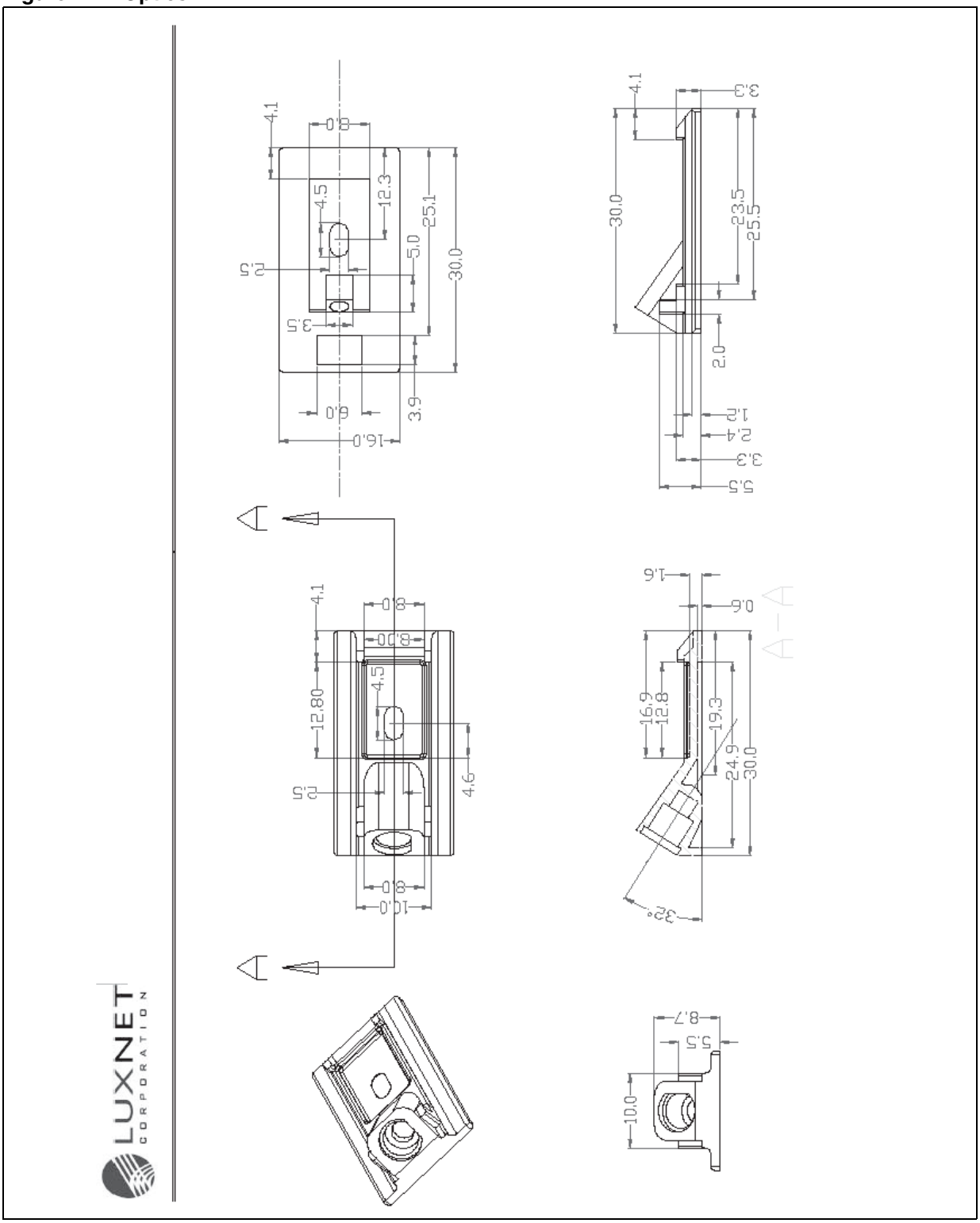


Figure 3. Layout guidelines 1

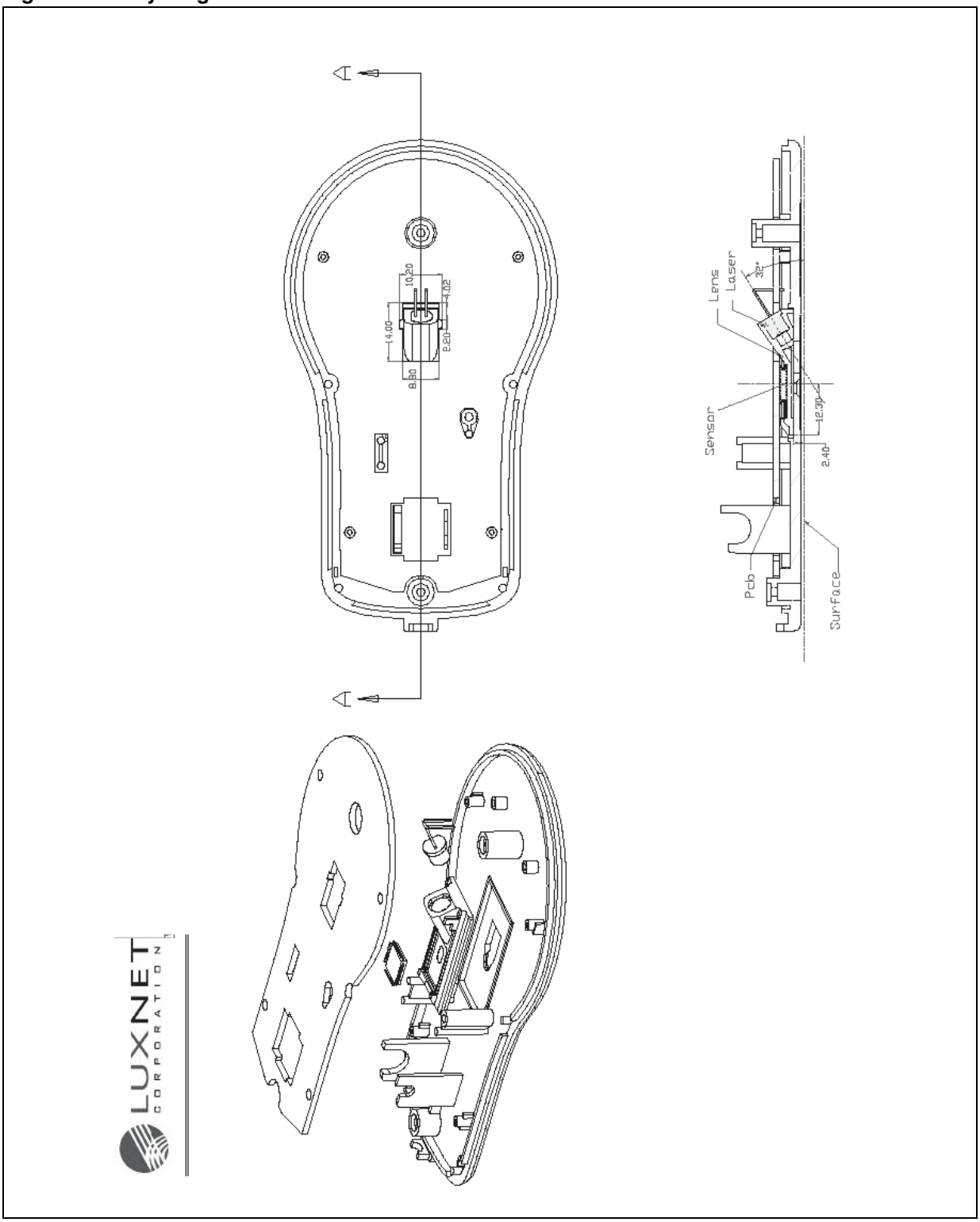
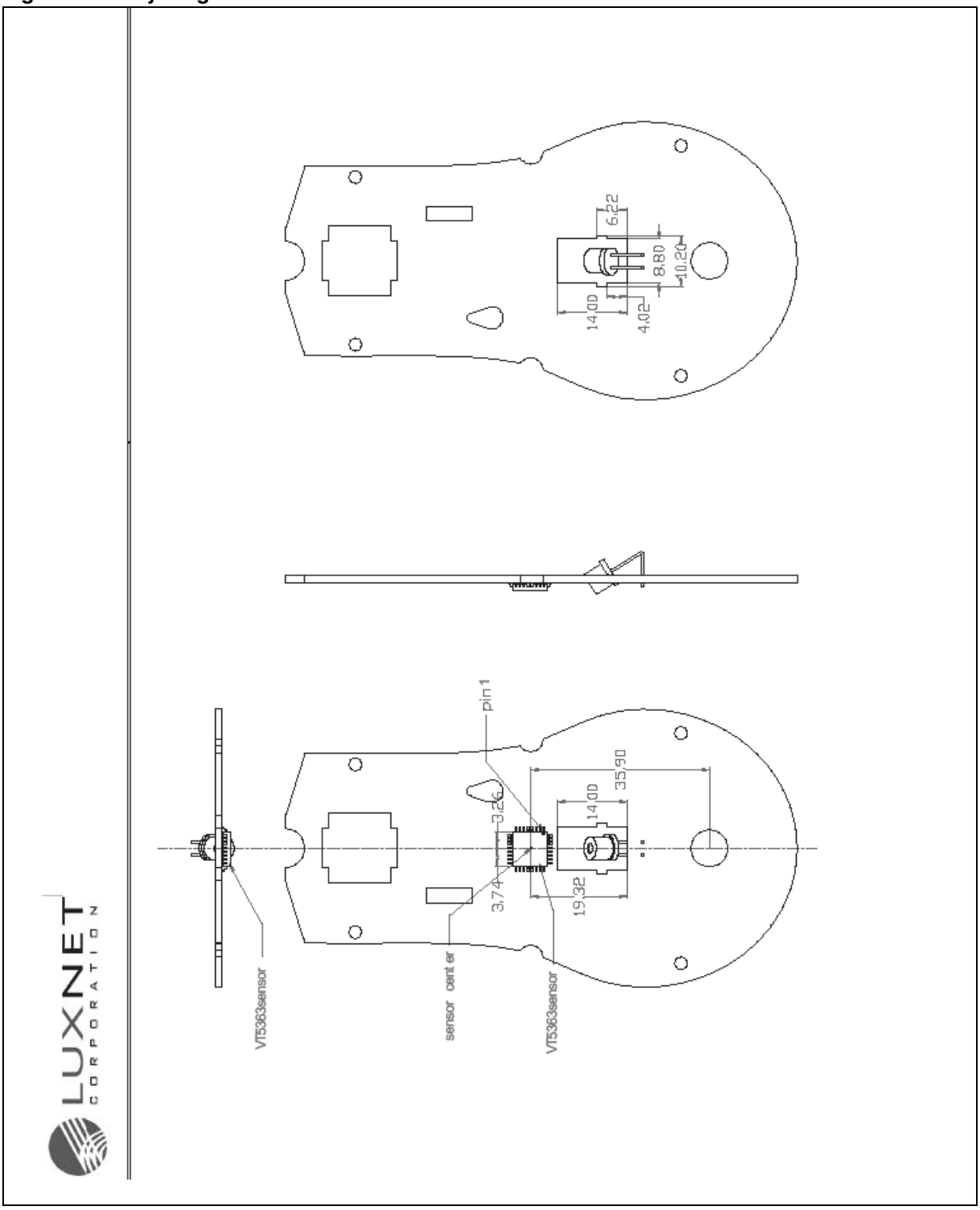


Figure 4. Layout guidelines 2



2.3 VCSEL datasheet

Figure 5. LD 851 datasheet

LUXNET CORPORATION
No. 50, Lung-Yuan 7th Road, Lung-Tan Tao-Yuan Hsien, TAIWAN
Tel: +886-3-409-1335 Fax: +886-3-409-1339

Single-Mode VCSEL Laser Lamp

Model No : LD851

- Features
  - High resistance to ESD
  - Superior
  - Suitable for Solid State
- Applications
  - 10º~12º Far field angle
  - Weather-resistance Epoxy
  - Laser Mouse

Absolute Maximum Ratings (Ta=25 °C)

Parameter	Symbol	Unit	Min.	Max.	Note
Forward Current	I_{max}	mA		12	
Reverse Voltage	V_r	V	5		Ir = −10uA
Operating Temperature	T_{op}	°C	0	45	
Storage Temperature	T_{stg}	°C	- 40	85	
Maximum Die Exposure	T_{max}	°C		260	for 10 sec.

Electrical/Optical Characteristics (Ta=25 °C)

Parameter	Symbol	Unit	Min.	Typ.	Max.	Test Condition
Threshold Current	I_{th}	mA	1	2	3	
Operating Voltage	V_{op}	V		2.0	2.5	@0.5 mW
Differential Resistance	R_s	Ω		60	130	I_f = 5 mA
Reverse Voltage	V_r	V	5			I_r= −10 μA
Slope Efficiency	η	mW/mA	0.1	0.2	0.35	I_f = 5 mA
Side Mode Suppression Ration	SMSR	dB	20	30		@0.5 mW
Peak Wavelength	λ	nm	830	845	860	@ 0.5 mW
Beam Divergence	θ	deg		12		full width, $1/e^2$
Optical Output Power	Po	mW	Bin 1: 0.40mW~0.45mW			@3.5mA
			Bin 2: 0.45mW~0.50mW			
			Bin 3: 0.50mW~0.55mW			
			Bin 4: 0.55mW~0.60mW			
			Bin 5: 0.60mW~0.65mW			
			Bin 6: 0.65mW~0.70mW			

Figure 6. LD 851 datasheet

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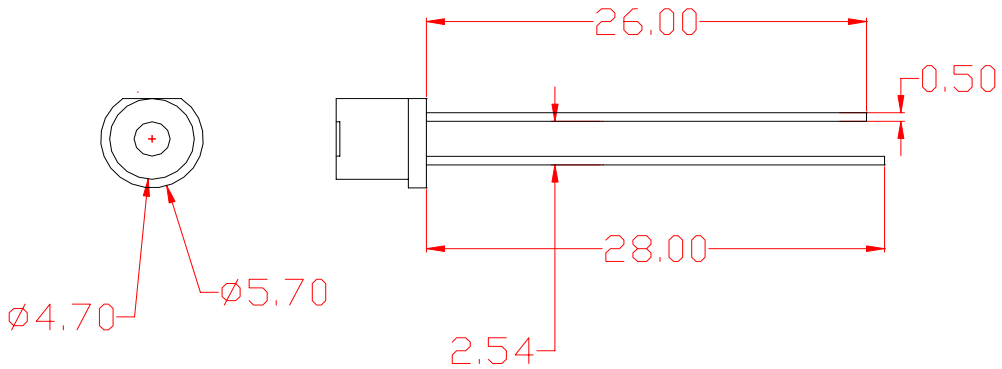

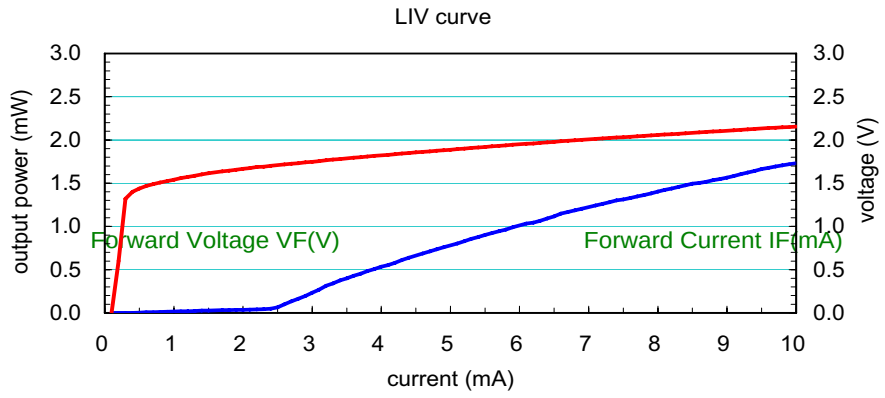

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Figure 7. LD 851 datasheet

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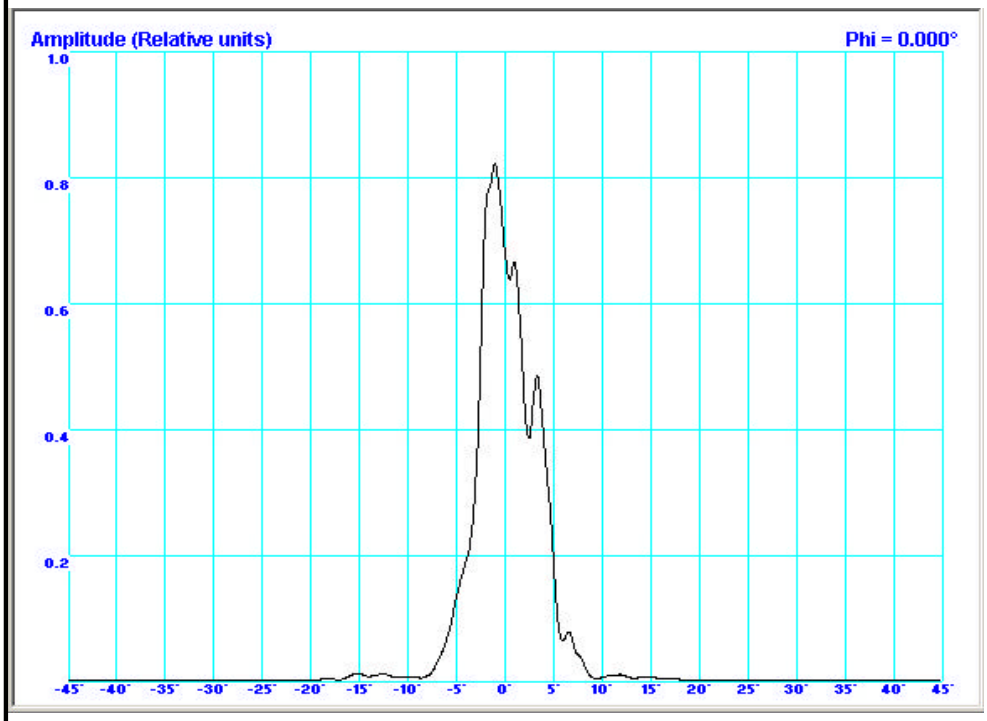
Far Field Angle



ISSUE	VERSION:	DATE:	ENGINEER:
	1	2007/1/1	
	DRAWING NO:	CHECKER:	APPROVER:
	LD851		

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2.4 VCSEL binning details

There are 5 separate grades for the VCSEL laser. As part of the manufacturing process the VCSELs are manually sorted into the 5 grades which means for the mouse manufacturers it is a simple process of choosing the right resistor combination for the grade of laser received.

Table 4. VCSEL binning

Bin grade	R2 + R2A value
1	80R
2	120R
3	150R
4	200R
5	230R

The value required for R2+R2A (see *Figure 1*) will be clearly indicated on the label (e.g. Bin match: 150 ohm).

3 Revision history

Table 5. Document revision history

Date	Revision	Changes
12-Jul-2007	1	Initial release.

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